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| EXAMINER | |
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| MOTSINGER, SEAN T | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/820,952 | COLLINS, DAVID C. | |
| | Examiner | Art Unit | |
| | SEAN MOTSINGER | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *17 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-7 and 9-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☒ Claim(s) *2,4,6,11,14,16,18,21,22 and 26-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

***Response to Arguments/Amendments***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/14/2008 has been entered.

Applicants arguments with respect to the double patenting rejections has been fully considered but are not persuasive. Applicants arguments state that figure 4 depicts the problem to be solved and there for cannot show the claim features. The examiner disagrees, figure 4 never says that it is a "problem to be solved" in fact it appears it is a problem which is being solved. Applicant next argues that equation 7 teaches away from the claimed invention because it teaches an iterative algorithm. The examiner disagrees; first the claim does not recite a one pass, second Jaynes does not teach away from a one pass algorithm merely because it does not use one, and *the claims clearly do not intend a one pass algorithm see dependent claim 6.*

Applicants arguments with respect to the rejections under 35 U.S.C. 103 have been fully considered but are not persuasive. The declaration of prior invention filed on 10/14/2008 is insufficient to establish a reduction to practice prior to Allen US 2004/0027363 as asserted by applicant.

First on page 1 of the declaration it is not clear which disclosure is being referred to because in element 7 applicant indicates that HP patent disclosure No. 200400519 is being referred too, however HP patent disclosure 200400670 has been attached as evidence. This inconsistency makes it unclear which disclosure is being referred to on pages 1-6 of declaration, e.g. which of the disclosures was allegedly filed prior to February 14?

Second the arguments or declaration fails to address any of the dependent claims in this case even if the independent claim is allowable if the features of the dependent claim do not have the same date they may not be allowable. Applicants response therefore fails to properly addresses any dependent claims.

Third applicant has mapped the claim elements to the disclosure but has not mapped the claim elements to the computer code (applicants alleged reduction to practice). Applicant has failed to indicate which elements found in Exhibit A pages 1-8 appear in the computer code of pages 9-14 it is unclear to the examiner if all aspects of claims are implemented in the computer code as well as described in the article. For example on page 11 of Exhibit A there is a comment "//err4_3 = don't update this - value we reall don't have enough information // I will need to check if an approximation is better then nothing though" this element should be explained because if is unclear to the Examiner if the invention has been fully implemented. Furthermore upon review of the code it appears that there is no implementation of the step "alternating between displaying the first sub-frame including the first one of the plurality of subframe pixel values in a first position and displaying the second sub-frame, including displating the

second one of the plurality of sub frame pixel values in a second position spatially offset from the first position" and therefore reduction to practice of all claim elements does not appear to be shown.

Fourth applicant has failed to provide any evidence that the code was tested and worked for its intended purpose or even that the code was compilable or executable; in section 9 applicant provides nothing more then mere allegations that the code was excited tested and display but has provided no actual evidence of any testing or explain how said testing represented actual working conditions (or a realistic simulation thereof). The display of one test image is not a realistic simulation of working conditions. Furthermore what has been tested needs to be in some way demonstrated to embody all of the claim elements in ever claim to show that what was tested includes all of the claim elements.

Fifth applicant indicates the disclosure was witnessed however it is unclear exactly what was witnessed, was the entirety of Exhibit A witnessed or what parts were witnessed, is the were pages 4-14 witnessed in their entirety unmodified from the exhibt presented to the office, were any test results witnessed? Furthermore Is the attachment indicated on page 1 of Exhibit A the same and unmodified from the article which has been presented to the office.

Finally in element 13 applicant makes reference to an Exhibit B which appears to be missing from the declaration.

***Requirement for Information***

A requirement for information under rule 37 C.F.R 105 is being made and the following information is being required:

a. Has the invention been Published Prior to filing?

b. If the invention has been published please provide a copy of the publication along with the date of publication

c. Has the invention been publicly announced prior to filing?

d. If the invention has been publicly announced please provide the date announced, where and in what context it was announced and a copy of any relevant information regarding the announcement e.g. (slides presented, summery of announcement, press release).

e. Has the invention been publicly disclosed prior to filing?

f. If the invention has been disclosed please provide a copy of any disclosure along with the date of any disclosure.

***Rejections Under 35 U.S.C. 101***

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim(s) 1-11 is/are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit

[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example claim the generating and alternating steps could be performed with out use of a machine or device.

Claim(s) 12-19 is/are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 12-19 defines a "system". However, while the preamble defines a "system", which would typically be indicative of an "apparatus", the body of the claim lacks definite structure indicative of a physical apparatus. Furthermore, the specification indicates that the invention may be embodied as pure software see paragraph 44. Therefore, the claim as a whole appears to be nothing more than a "system" of software elements, thus defining functional descriptive material per se.

Functional descriptive material may be statutory if it resides on a "computer-readable medium or computer-readable memory". The claim(s) indicated above lack structure, and do not define a computer readable medium and are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests:

1. Amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory; or

2. Adding structure to the body of the claim that would clearly define a statutory apparatus.

***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-29 of copending Application No. 10/821130 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because (similar limitations are in bold) claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames, wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values** and a plurality of error values**, and wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data, at least a second one of the plurality of sub- frame pixel values,** and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames, wherein the first and the second sub-frames comprise**

**a plurality of sub-frame pixel values, and wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data and at least a second one of the plurality of sub-frame pixel values; and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify claim 1 of the copending application to include the plurality of error values and display the sub-frames using error values as taught by the disclosure of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b, and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-29 of copending Application No. 10/864,125 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

**A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-**

**frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

**A method of displaying an image with a display device, the method comprising: receiving first image data for the image,** the first image data associated with a first color space; converting the first image data to second image data associated with a second color space; **generating first and second sub-frames using the second image data; and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in the art at the time of invention to have first and second sub-frames of copending claim 1 comprise a plurality of sub-frame pixel values as taught by copending claim 11, and to have at least a first one of the plurality of sub-frame pixel values calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-25 of copending Application No. 10/868,638 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image, the image data comprising a first portion and a second portion; generating a first plurality of sub-frames using the first portion** and a first simulation kernel; **generating a second plurality of sub-frames** using the second portion and the first simulation kernel independently from generating the first plurality of sub- frames; **and alternating between displaying a first one of the first plurality of sub-frames in a first position, displaying a second one of the first plurality of sub-frames in a second position spatially offset from the first position,** displaying a first one of the second plurality of sub-frames in a third position spatially offset from the first and the second positions, and displaying a second one of the second plurality of sub-frames in a fourth position spatially offset from the first, the second, and the third positions.

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and second sub-frames of copending claim 1 to comprise a plurality of sub-frame pixel values as implied by copending claim 3, and to have at least a first one of the plurality of sub-frame pixel values calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values as implied by copending claim 3 and as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel

value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-29 of copending Application No. 10/868,719 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying images with a display device, the method comprising: receiving first image data associated with a first image;** converting a portion of the first image data to zero values; **generating a first set of three sub-frames using the first image data; and alternating between displaying the first set of three sub-frames in first, second, and third positions, wherein the second position is spatially offset from the first position, and wherein the third position is spatially offset from the first and the second positions.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and second of the three sub-frames of copending claim 1 to comprise a plurality of sub-frame pixel values and to have at least a first one of the plurality (which is three in this claim) of sub-frame pixel values calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-27 of copending Application No. 10/992,926 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: generating a first sub-frame and a second sub-frame corresponding to image data for the image, wherein generating the first sub-frame includes calculating a first sub-frame pixel value in the first sub-frame** using a first sharpening factor associated with a first plurality of gradients from the image data; **and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and second of the three sub-frames of copending claim 1 to comprise a plurality of sub-frame pixel values and to have at least a first one of the plurality of sub-frame pixel values calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-32 of copending Application No. 10/750,591 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a

plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data**, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

**A method of displaying an image with a display device** having a set of defective display pixels, **the method comprising: receiving image data for the image; generating a first sub-frame and a second sub-frame corresponding to the image data; and selecting a first position and a second position spatially offset from the first position,** the first and the second positions selected based on positions of the defective display pixels and characteristics of a human visual system; **and alternating between displaying the first sub-frame in the first position and displaying the second sub-frame in the second position.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims of copending Application No. 10/697,605 in view of "Super-Resolution

Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data**, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image** on a high resolution grid; **generating a first sub-frame and a second sub-frame corresponding to the image data,** the first and the second sub-frames each generated on a low resolution diamond grid; **and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value

of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-42 of copending Application No. 10/696,888 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image** on a first type of grid; **generating a first sub-frame and a second sub-frame corresponding to the image data,** the first and the second sub-frames each generated on a second type of grid that is different than the first type of grid, wherein one of the first type of grid and the second type of grid is a non-rectangular grid; **and alternating between displaying the first sub-frame in a first position and displaying the**

**second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-33 of copending Application No. 10/821,135 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-**

**frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

**A method of displaying an image with a display device, the method comprising: receiving image data for the image,** the image data comprising a first set of pixels; **generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels,** wherein each of the second set of pixels is centered relative to one of the first set of pixels; **and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-24 of copending Application No. 10/632,042 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been

patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image** at a first resolution; **generating a first sub-frame and a second sub-frame based on combinations of pixel values from the image data,** the first and second sub-frames having a second resolution which matches the display device and each have an area equal to the image data; and controlling an image shifter to allow for **alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position on the display device.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as implied by claims 2-24 of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a

depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-20 of copending Application No. 10/672,544 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data**, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying images with a display device, the method comprising: receiving image data for a plurality of image frames; generating at least one sub-frame for each image frame based on the received image data; displaying the sub-frames for each image frame in a first set of the plurality of image frames at a first plurality of spatially offset positions; and displaying the sub-frames for each image frame in a second set of the plurality of image frames at a second plurality of spatially offset positions that is different than the first plurality of spatially offset positions;** and sequentially displaying a plurality of colors during the display of each of the sub-frames.

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-30 of copending Application No. 10/768,621 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-**

**frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

**A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating a plurality of sub-frames corresponding to the image data, the sub-frames generated based on a set of spatially offset sub-frame positions,** a first function that represents a simulated high resolution image, and a second function that represents a desired high resolution image; **and displaying the sub-frames at the set of spatially offset positions.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-32 of copending Application No. 10/768,215 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been

patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating a plurality of multiple-pixel image sub-frames corresponding to the image data; and displaying the sub-frames** in a circularly shifted manner **at a set of spatially offset positions located on a circle.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-30 of copending Application No. 10/947,762 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device** having a plurality of defective pixels, **the method comprising:** selecting an offset between a first sub-frame and a second sub-frame using information associated with the plurality of defective pixels; **generating the first sub-frame and the second sub-frame using image data for the image; adjusting a first sub-frame pixel value** in the first sub-frame associated with one of the plurality of defective pixels; and **alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position, the second position displaced from the first position by an amount defined by the offset.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values as implied by claim 1 of the copending application, and at least a first one

of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are provisionally rejected on the ground of nonstatutory double patenting over claims 1-26 of copending Application No. 10/996,083 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the copending application recites

> **A method of displaying an image with a display device** having at least one defective display pixel, **the method comprising: generating first, second, and**

> **third sub-frames using image data for the image,** information that identifies the at least one defective display pixel, **a first pixel offset associated with the second sub-frame, and a sub-pixel offset associated with the third sub-frame; and alternating between displaying the first sub-frame in a first position, displaying the second sub-frame in a second position spatially offset from the first position according to the first pixel offset, and displaying the third sub-frame in a third position spatially offset from the first position and the second position according to the sub-pixel offset.**

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as implied by claim 1 of the copending application and as taught by the figures and specification of the copending application and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-33 of U.S. Patent No. 7,030,894 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a

plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data**, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the U.S. Patent recites

**A method of displaying an image, the method comprising: receiving image data for the image;** buffering the image data for the image, including creating a frame of the image; **defining a first sub-frame and at least a second sub-frame for the frame of the image from the image data, the second sub-frame being spatially offset from the first sub-frame; and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position**, wherein defining the second sub-frame further includes defining a third sub-frame and a fourth sub-frame for the frame of the image from the image data, the fourth sub-frame being spatially offset from the third sub-frame and the third sub-frame and the fourth sub-frame both being spatially offset from the first sub-frame and the second sub-frame, and wherein alternating between displaying the first sub-frame and displaying the second sub-frame further includes alternating between displaying the first sub-frame in the first position, displaying the second sub-frame in the second position, displaying the third sub-frame in a third position spatially offset from the first position and the second position, and displaying the fourth sub-frame in a fourth position spatially offset from the first position, the second position, and the third position.

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the U.S. Patent and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first

sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-60 of U.S. Patent No. 7,034,811 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the U.S. Patent recites

> **A method of displaying an image with a display device** including a plurality of display pixels, **the method comprising: receiving image data for the image,** the image data including individual pixels of the image; buffering the image data and creating a frame of the image, the frame of the image including a plurality of columns and a plurality of rows of the pixels of the image; **defining a first sub-frame and at least a second sub-frame for the frame of the image, image data of the second sub-frame being offset from image data of the first sub-frame by an offset** distance of at least one pixel; **and displaying the first sub-frame with a first plurality of the display pixels and displaying the second sub-frame with a second plurality of the display pixels offset from the first**

> **plurality of the display pixels by the offset distance,** wherein at least one of the display pixels of the display device is a defective display pixel, and wherein displaying the first sub-frame with the first plurality of the display pixels and displaying the second sub-frame with the second plurality of the display pixels includes diffusing an affect of the defective display pixel over the image.

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated and displayed using the image data and at least a second one of the plurality of sub-frame pixel values, as taught by the figures and specification of the U.S. Patent and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Claims 1-30 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-37 of U.S. Patent No. 7,109,981 in view of "Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes"). This is a provisional double patenting rejection since the conflicting claims have not yet been patented. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of this application recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating first and second sub-frames,** wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values and a plurality of error values, and **wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data,** at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values; **and alternating between displaying the first sub-frame,** including displaying the first one of the plurality

> of sub-frame pixel values, **in a first position and displaying the second sub-frame,** including displaying the second one of the plurality of sub-frame pixel values, **in a second position spatially offset from the first position.**

Claim 1 of the U.S. Patent recites

> **A method of displaying an image with a display device, the method comprising: receiving image data for the image; generating a first sub-frame and a second sub-frame corresponding to the image data,** the first and the second sub-frames generated based on minimization of an error between the image data and a simulated image; **and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position** wherein the simulated image is based on upsampling of the first and second sub-frames, thereby generating upsampled sub-frame data.

It would have been obvious to one of ordinary skill in this art at the time of invention to have the first and the second sub-frames comprise a plurality of sub-frame pixel values, and at least a first one of the plurality of sub-frame pixel values is calculated using the image data and at least a second one of the plurality of sub-frame pixel values, and displaying the first and second sub-frame pixel values as taught by the figures and specification of the U.S. Patent and as taught by Jaynes who shows in figure 4 that a sub-frame pixel value of a first sub-frame a depends on the pixel value of a second sub-frame pixel value b and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 3, 5, 7, 9, 10, 12, 13, 15, 17, 19, 20, and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Application Publication Number 2004/0027363 published February 12, 2004 by Allen in view of Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes").

Allen discloses receiving image data for the image (image 12 of figure 1); generating first and second sub-frames (sub-frame generation 36), wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values (figure 2C), and wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data and at least a second one of the plurality of sub-frame pixel values (figure 7E); and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position (image shifter 38).

Although Allen does not explicitly state that the first one of the plurality of sub-frame pixel values is calculated using the image data, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values, Jaynes in figure 4 says that pixel values a1 and b1 must be determined so that k1=a1+b1 and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have at least a first one of the plurality of sub-frame pixel values calculated using the image data, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values, and to display the first one and

the second one of the plurality of sub-frame pixel values, because the value of b1 influences the values of k1, k2, k3, and k4, which means that the pixel values for a single sub-frame are not independent as taught by Jaynes in figure 4.

For claim 3, Jaynes discloses generating the first and the second sub-frames using first and second simulation kernels (Jaynes page 5 column 1 see equations 4 5 and 6).

For claim 5, Jaynes discloses generating the first and the second sub-frames using an error kernel (Jaynes page 5 column 2 last two paragraphs).

For claim 7, both Allen and Jaynes disclose generating third and fourth sub-frames, the first, the second, the third, and the fourth sub-frames comprising the plurality of sub-frame pixel values ; and alternating between displaying the first sub-frame in the first position and displaying the second sub-frame in the second position spatially offset from the first position, displaying the third sub-frame in a third position spatially offset from the first position and the second position, and displaying the fourth sub-frame in a fourth position spatially offset from the first position, the second position,

and the third position (page 6 column 2 Jaynes suggests that ore then 2 i.e. K projectors can be used also see Paragraph 55 of allen) .

For claim 9, both Allen and Jaynes disclose the first one of the plurality of sub-frame pixel values is calculated using the image data, the second one of the plurality of sub-frame pixel values, and a third one of the plurality of sub-frame pixel values that is associated with the discloses sub-frame (each sub frame has its own pixels).

For claim 10, Jaynes disclose generating the first and the second sub-frames, wherein the first and the second sub-frames comprise the plurality of sub-frame pixel values and the plurality of error values ( Jaynes page 5 second column), and wherein at least the first one of the plurality of sub-frame pixel values is calculated using the image data, at least the second one of the plurality of sub-frame pixel values, at least the one of the plurality of error values (Jaynes page 5 second column ), and a plurality of sharpening factors (page 6 fourth paragraph ).

For claim 12, Allen shows, in figure 1, a buffer 22 adapted to receive image data for the image; an image processing unit 24 configured to generate first and second sub-frames comprising a plurality of rows of sub-frame pixel values, calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of

rows, and at least one error value; and a display device 26 adapted to alternately display the first sub-frame in a first position and the second sub-frame in a second position spatially offset from the first position.

Although Allen does not explicitly state that each of the sub-frame pixel values in each of the plurality of rows is calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of rows, and at least one error value, Jaynes in figure 4 says that pixel values a1 and b1 must be determined so that k1=a1+b1 and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the value of a sub-frame pixel value in row b using a sub-frame pixel value in row a because the value of a1 influences the value of k1, which means that the pixel values for a single sub-frame are not independent as taught by Jaynes in figure 4.

For claim 13, Jaynes discloses generating the first and the second sub-frames using first and second simulation kernels (Jaynes page 5 column 1 see equations 4 5 and 6).

For claim 15, Jaynes discloses generating the first and the second sub-frames using an error kernel (Jaynes page 5 column 2 last two paragraphs).

For claim 17, Jaynes disclosse the image processing unit is configured to generate third and fourth sub-frames comprising the plurality of rows of sub-frame pixel values, wherein each of the sub-frame pixel values in each of the plurality of rows is calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of rows, and at least one error value (page 6 columns 1 fifth paragraph note the pixels are determined from their surrounding pixels and error values).

For claim 19, both Allen and Jaynes disclose the image comprises a first plurality of pixels at a first resolution, and wherein the first and the second sub-frames comprise a second plurality of pixels at a second resolution less than the first resolution (see jaynes figure 4 and Allen see abstract) .

For claim 20, Allen discloses means for receiving image data corresponding to the image 12; means for generating a plurality of rows of initial values 34 using the image data; means for accessing 24 a row of history values generated using the image data; and means for generating a sub-frame pixel value 36 using the row of history values and the plurality of rows of initial values (see figures 13A-15 which modify the .

Allen does not explicitly disclose accessing a row of history values and error values generated using the image data and generating a sub-frame pixel value using the row of history values and the plurality of rows of initial values, but Jaynes discloses

means for accessing a row of history values and error values generated using the image data (the outermost boundary pixels form a row of pixel values that can no longer be adjusted); and means for generating a sub-frame pixel value using the row of history values and the plurality of rows of initial values (the remaining component image pixels, p, are then visited in random order in each image and are corrected by reducing an error function. Starting from the periphery, pixels are iteratively adjusted according to the algorithm in all component images that can influence the value of a high-resolution target).

It would have been obvious to one of ordinary skill in the art at the time of the invention to determine a final sub-frame pixel value using initial values, error values and history values as taught by Jaynes to reduce global error.

For claim 23, Jaynes discloses the means for generating the sub-frame pixel value includes means for generating the sub-frame pixel value using the row of history values and error values, the plurality of rows of initial values, a first simulation kernel, a second simulation kernel, and an error kernel (page 6 fifth paragraph).

For claim 24, Jaynes disclose means for generating the sub-frame pixel value includes means for generating the sub-frame pixel value using the row of history values and error values, the plurality of rows of initial values, and a simulation kernel (page 6 fifth paragraph).

For claim 25, Allen discloses receiving image data corresponding to the image 12; generating a first plurality of initial values associated with a first pixel which corresponds to a first one of the plurality of sub-frames using the image data 34; generating a first sub-frame pixel value 36 using the image data and the first plurality of initial values, wherein the first sub-frame pixel value comprises a first history value; generating a first error value using the image data and the first plurality of initial values, generating a second plurality of initial values associated with a second pixel which corresponds to a second one of the plurality of sub-frames using the image data 34.

Allen does not explicitly disclose that the first sub-frame pixel value is a first history value, and generating a second sub-frame pixel value using the image data, the second plurality of initial values, the first error value, and the first history value. Jaynes discloses an iterative algorithm that determines initial values, revises the initial values, and calculates final values using initial values and revised values.

It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate a second sub-frame pixel value using the image data, the second plurality of initial values, an error value and a history value in order to reduce global error as taught by Jaynes.

Claims 1, 3, 5, 7, 9, 10, 12, 13, 15, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Margulis et al U.S. 6,340,994 published February 12,

2004 by Allen in view of Super-Resolution Composition in Multi-Projector Displays" by Jaynes et al. ("Jaynes").

Re claim 1 Margulis discloses receiving image data for the image (column 18 lines 20-25); generating first and second sub-frames (column 18 lines 25-30), wherein the first and the second sub-frames comprise a plurality of sub-frame pixel values (column 18 lines 25-30), and wherein at least a first one of the plurality of sub-frame pixel values is calculated using the image data and at least a second one of the plurality of sub-frame pixel values (column 18 lines 35-40); and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position (column 19 lines 50-55 ).

Although Margulis does not explicitly state that the first one of the plurality of sub-frame pixel values is calculated using the image data, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values, Jaynes in figure 4 says that pixel values a1 and b1 should be determined so that k1=a1+b1 and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have at least a first one of the plurality of sub-frame pixel values calculated using the image data, at least a second one of the plurality of sub-frame pixel values, and at least one of the plurality of error values, and to display the first one and the second one of the plurality of sub-frame pixel values, because the value of b1

influences the values of k1, k2, k3, and k4, which means that the pixel values for a single sub-frame are not independent as taught by Jaynes in figure 4.

Re claim 3 Margulis and Jaynes discloses generating the first and the second sub-frames using first and second simulation kernels (Jaynes page 5 column 1 see equations 4 5 and 6 Margulis see column 18 lines 30-55 column 20 lines 1-20).

Re claim 5 Jaynes discloses generating the first and the second sub-frames using an error kernel (Jaynes page 5 column 2 last two paragraphs).

For claim 7, Margulis and Jaynes disclose generating third and fourth sub-frames, the first, the second, the third, and the fourth sub-frames comprising the plurality of sub-frame pixel values ; and alternating between displaying the first sub-frame in the first position and displaying the second sub-frame in the second position spatially offset from the first position, displaying the third sub-frame in a third position spatially offset from the first position and the second position, and displaying the fourth sub-frame in a fourth position spatially offset from the first position, the second position, and the third position (page 6 column 2 Jaynes suggests that ore then 2 i.e. K projectors can be used see Margulis column 18 lines 30-55)) .

For claim 9, both Margulis and Jaynes disclose the first one of the plurality of sub-frame pixel values is calculated using the image data, the second one of the plurality of sub-frame pixel values, and a third one of the plurality of sub-frame pixel values that is associated with the discloses sub-frame (each sub frame has its own pixels).

For claim 10, Jaynes disclose generating the first and the second sub-frames, wherein the first and the second sub-frames comprise the plurality of sub-frame pixel values and the plurality of error values ( Jaynes page 5 second column), and wherein at least the first one of the plurality of sub-frame pixel values is calculated using the image data, at least the second one of the plurality of sub-frame pixel values, at least the one of the plurality of error values (Jaynes page 5 second column ), and a plurality of sharpening factors (page 6 fourth paragraph ).

For claim 12, Margulis shows,, a buffer adapted to receive image data for the image (element 240 figure 3 ); an image processing unit (element 210 figure 3) configured to generate first and second sub-frames comprising a plurality of rows of sub-frame pixel values, calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of rows (see rejection of claim 1); and a display device adapted to alternately display the first sub-frame in a first position and

the second sub-frame in a second position spatially offset from the first position (see rejection of claim 1.

Although Margulis does not explicitly state that each of the sub-frame pixel values in each of the plurality of rows is calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of rows, and at least one error value, Jaynes in figure 4 says that pixel values a1 and b1 must be determined so that k1=a1+b1 and an unbiased error metric is used to converge the sub-images as discussed in equation 7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the value of a sub-frame pixel value in row b using a sub-frame pixel value in row a because the value of a1 influences the value of k1, which means that the pixel values for a single sub-frame are not independent as taught by Jaynes in figure 4.

Re claim 13 Margulis and Jaynes discloses generating the first and the second sub-frames using first and second simulation kernels (Jaynes page 5 column 1 see equations 4 5 and 6 Margulis see column 18 lines 30-55 column 20 lines 1-20).

Re claim 15 Jaynes discloses generating the first and the second sub-frames using an error kernel (Jaynes page 5 column 2 last two paragraphs).

For claim 17, Jaynes disclosse the image processing unit is configured to generate third and fourth sub-frames comprising the plurality of rows of sub-frame pixel values, wherein each of the sub-frame pixel values in each of the plurality of rows is calculated using the image data, at least one sub-frame pixel value from a previous one of the plurality of rows, and at least one error value (page 6 columns 1 fifth paragraph note the pixels are determined from their surrounding pixels and error values).

For claim 19, both Margulis and Jaynes disclose the image comprises a first plurality of pixels at a first resolution, and wherein the first and the second sub-frames comprise a second plurality of pixels at a second resolution less than the first resolution (see Jaynes figure 4 and Margulis see abstract).

***Allowable Subject Matter***

Claims 2, 4, 6, 11, 14, 16, 18, 21-22, and 26-30 would be allowable if rewritten to overcome the double patenting rejection(s) set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. In claims 2 and 18 The prior art does not disclose "wherein the image comprises a plurality of image pixels, wherein each of the plurality of sub-frame pixel values corresponds to a sub-frame pixel that is centered with respect to one of the plurality of image pixels" in the prior art the sub frame pixels are not centered with respect to a pixel value. In claim 4 "wherein the first one of the plurality of sub-frame pixel values is calculated using the first simulation

kernel in response to an initial value associated with the first one of the plurality of sub-frame pixel values being non-zero, and wherein the first one of the plurality of sub-frame pixel values is calculated using the second simulation kernel in response to the initial value associated with the first one of the plurality of sub-frame pixel values being zero" is not disclosed in the prior art. In claim 6 "wherein a region of influence associated with the first one of the plurality of sub-frame pixel values comprises a number of pixel values that corresponds to a number of iterations used to generate the first and the second sub-frames" is not found in the prior art. Re claim 11 "generating each of the plurality of error values such that a first number of bits of each of the plurality of error values is equal to a second number of bits of each of the plurality of sub-frame pixel values" is not found in the prior art. In claims 14 and 16 The specific filters disclosed are not found in the prior art with respect sub frame generation. In claims 21 and 22 the number of iterations is not controlled in this manner. In claim 26 "generating a second error value using the image data and the third plurality of initial values; and generating the second sub-frame pixel value using the image data, the second plurality of initial values, the first history value, the second history value, the first error value, and the second error value" is not found in the prior art of record.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN MOTSINGER whose telephone number is (571)270-1237. The examiner can normally be reached on 9-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571)272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Motsinger
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